

REMARKS

This application has been reviewed in light of the Office Action dated January 24, 2003. Claims 1-3 and 7-11 are pending in this application. Claims 1 and 8, which are the independent claims, have been amended to emphasize that no particular ordering of the operation modes exists in the claimed invention, and that the photoelectric conversion mode and the idling mode emit carriers of the same type. Favorable reconsideration is requested.

Claims 1-3 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent Application No. 09-098970 (Endo et al.) in view of U.S. Patent No. 5,591,963 (Takeda et al.), and Claim 7 was rejected under Section 103(a) as being unpatentable over Endo et al. in view of Takeda et al., U.S. Patent No. 5,591,960 (Furukawa et al.), and U.S. Patent No. 4,740,710 (Arita). Claim 8 was rejected under Section 103(a) as unpatentable over Endo et al. in view of Takeda et al. and U.S. Patent No. 5,596,198 (Perez-Mendez), or, in the alternative, in view of Takeda et al. and U.S. Patent No. 4,179,100 (Sashin et al.). Claim 10 was rejected under Section 103(a) as unpatentable over Endo et al. in view of Takeda et al. and Perez-Mendez, or, in the alternative, in view of Takeda et al., Sashin et al., and JP363250634A (Takeuchi et al.). Claim 11 was rejected under Section 103(a) as unpatentable over Endo et al. in view of Takeda et al., and JP406029510A (Hikiji et al.).

Applicants submit that amended independent Claims 1 and 8, together with the remaining dependent claims, are patentably distinct from the proposed combination of the cited prior art for at least the following reasons.

Claim 1 requires a photoelectric converter including a photoelectric conversion element of a laminated structure including a first electrode layer, an insulation layer, a photoelectric conversion semiconductor layer, an injection blocking layer, a second electrode layer, and a switching means. The insulation layer is for blocking the passage of holes and electrons. The injection blocking layer is for blocking the injection of only one of the holes or the electrons to the photoelectric conversion semiconductor layer. The switching means is for operating the photoelectric converter by switching through operation modes including a photoelectric conversion mode, an idling mode, and a refresh mode. The photoelectric conversion mode emits one of the holes or the electrons, whichever one is emitted in the idling mode, generated in accordance with an amount of incident light. The idling mode emits one of the holes or the electrons, whichever one is emitted in the photoelectric conversion mode, from the photoelectric conversion element. And, the refresh mode emits the other of the holes or the electrons from the photoelectric conversion element.

One notable feature of Claim 1 is the idling mode for emitting one of the holes or the electrons, whichever one is emitted in the photoelectric conversion (read) mode, from the photoelectric conversion element. Support for this feature can be found in the specification at least at page 45, line 24, to page 46, line 2, which states, in part, that “an idling mode is provided to emit electrons injected in the interface defect in the interface between the i layer 4 and the insulation layer 70” The i layer 4 and the insulation layer 70 are shown in Figures 6A and 18C. The presence of the electrons injected in the interface defect occurs naturally in the device and causes noise which lowers the signal-to-noise ratio. (See page 46, lines 9-15 of the specification). By providing an idling mode,

which emits the electrons injected into the interface defect to the electrode D shown in Figure 19, the noise caused by these electrons is removed from the device, allowing for a high signal to noise ratio. (See page 49, lines 1-15).

As stated earlier, the idling mode emits one of the holes or the electrons, whichever one is emitted in the photoelectric conversion mode, from the photoelectric conversion element. Support for emitting the same carrier as that emitted in the photoelectric conversion mode can be found at least at page 45, line 24, to page 46, line 2, and page 19, lines 20-24. These portions of the specification describe that both the photoelectric conversion mode and the idling mode emit electrons. In contrast, the refresh mode, also present in Claim 1, emits holes, the carrier opposite to that emitted in the photoelectric conversion and idling modes. (See page 19, lines 9-13). (It is to be understood, of course, that the scope of Claim 1 is not limited to the details of these embodiments, which are referred to only for purposes of illustration.)

In rejecting Claim 1, the Office Action first refers to Endo et al., and states that “Endo et al. do not specifically distinguish an idling mode for emitting one of the holes or electrons from the photoelectric conversion element” (See the bottom of page 3 of the Office Action). Applicants agree with this assertion and submit that Endo et al. also does not specifically distinguish an idling mode for emitting one of the holes or electrons, whichever one is emitted in the photoelectric conversion mode, from the photoelectric conversion element, as recited in Claim 1. The Office Action then combines the teachings of Takeda et al. with Endo et al. to allegedly disclose the idling mode recited in Claim 1 and lacking in Endo et al. (See pages 3-4 of the Office Action).

As an alleged disclosure of the idling mode, the Office Action states that Takeda et al. allows “both zero and positive values for the voltage V_{UB} in what they call ‘refresh’ mode (cf. column 9, lines 58-65), but which settings correspond to refresh mode and idling mode, respectively, in the nomenclature of Applicant.” (Pages 3-4 of the Office Action). If the refresh mode of Takeda et al. is to correspond to Applicants’ claimed idling mode, the refresh mode of Takeda et al. must perform the function of emitting the same carrier as that of a read mode, as is required by the amended language of Claim 1.

However, Applicants submit that Takeda et al. does not teach or suggest such a use of its refresh mode. In particular, the goal of the refresh mode of Takeda et al. is to recombine hole-electron pairs created by heat present in the device or by incident light during a read operation. (See column 7, line 65, to column 8, line 2; and column 9, lines 20-36). Applicants have not found any disclosure in Takeda et al. which relates to the refresh mode of Takeda et al. being used to *emit one of the holes or the electrons*, let alone, *emitting whichever one is emitted in the photoelectric conversion mode*, as recited in Claim 1.

Further, the read (photoelectric conversion) mode of Takeda et al. is not understood to emit *one of the holes or electrons*, as required by Claim 1. Applicants take this view because the read mode of Takeda et al., shown in Figure 5B, merely creates electron-hole pairs that are trapped between two insulating layers 70 and 71, i.e., it is not shown to emit one of the holes or electrons. (See column 8, lines 2-28). Since the read mode of Takeda et al. is not believed to emit one of the holes or electrons according to Claim 1, Applicants submit that the refresh mode of Takeda et al., therefore, cannot emit one of the holes or electrons, whichever one is emitted in the photoelectric conversion (read) mode, as required by Claim 1.

In summary, Applicants submit that Takeda et al. merely discloses a refresh mode whose goal is to recombine electron-hole pairs, not to emit one of the holes or the electrons, whichever one is emitted in the read mode. Further, the read mode of Takeda et al. is not believed to emit one of the holes or the electrons, and, therefore, the refresh mode cannot emit one of the holes or the electrons, whichever one is emitted in the read mode. Accordingly, Applicants believe that the refresh mode disclosed in Takeda et al. does not correspond to the idling mode of Claim 1. Therefore, Applicants submit that nothing in Takeda et al. would teach or suggest to a person having ordinary skill in the relevant art, the idling mode for emitting one of the holes or the electrons, whichever one is emitted in the photoelectric conversion mode, from the photoelectric conversion element, as recited in Claim 1.

Applicants also submit that the proposed combination of Endo et al. and Takeda et al., assuming such combination would even be permissible, would still fail to teach or suggest the idling mode recited in Claim 1. Applicants take this view because the disclosure in Takeda et al. regarding a refresh mode used merely to recombine electron-hole pairs, is believed to be insufficient to teach or suggest an idling mode for emitting one of the holes or the electrons, whichever one is emitted in the photoelectric conversion mode, from the photoelectric conversion element. Accordingly, Applicants submit that Claim 1 is patentable over these two references taken separately or in any proper combination.

Independent Claim 8 includes the same feature of the idling mode as discussed above in connection with Claim 1 and is believed to be patentable for at least the same reasons. Further, Applicants have reviewed Perez-Mendez and Sashin et al., both

relied upon in the rejection of Claim 8, and have not found anything that is believed to teach or suggest the idling mode for emitting one of the holes or the electrons, whichever one is emitted in the photoelectric conversion mode, from the photoelectric conversion element, as recited in Claim 8. Therefore, Applicants submit that the proposed combination of Endo et al., Takeda et al., and Perez-Mendez, or the proposed combination of Endo et al., Takeda et al., and Sashin et al., assuming such combinations would even be permissible, would still fail to teach or suggest the idling mode recited in Claim 8. Accordingly, Applicants submit that Claim 8 is patentable over these references taken separately or in any proper combination.

A review of the other art of record has failed to reveal anything that, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as applied against the independent claims herein. Therefore, those claims are respectfully submitted to be patentable over the art of record.

The other rejected claims in this application depend from one or another of the independent claims discussed above and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and the allowance of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "J. K. Kause", written over a horizontal line.

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